

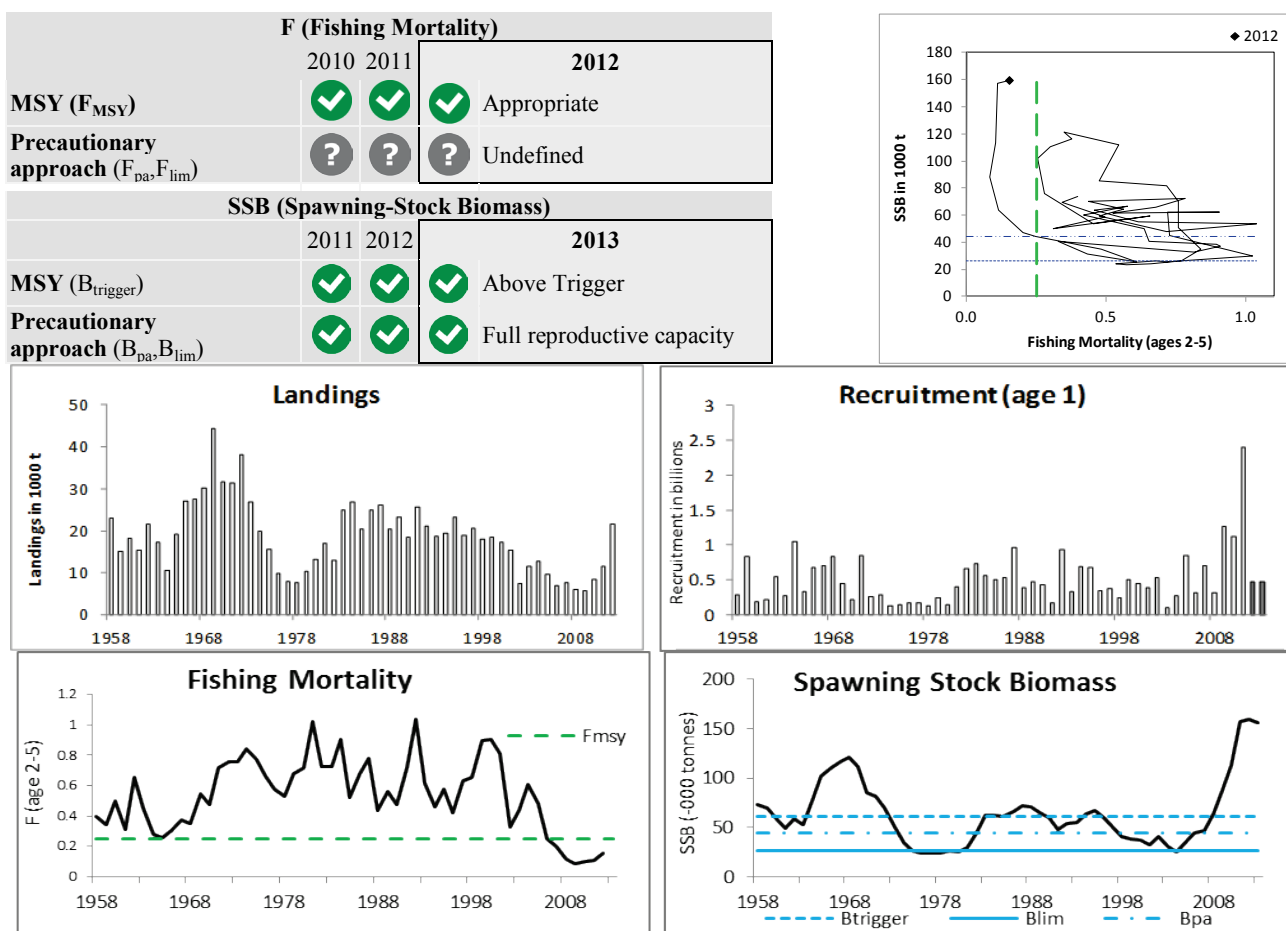
**ECOREGION** Celtic Seas  
**STOCK** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland)

**Advice for 2014**

ICES advises on the basis of the MSY approach that catches should be no more than 35 942 t in 2014. Discards are considered to be low, therefore, all catches are assumed to be landed.

ICES advises that activities that have a negative impact on the spawning habitat of herring, such as extraction of marine aggregates and marine construction on the spawning grounds, should not occur.

**Stock status**



**Figure 5.4.15.1** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). Summary of the stock assessment. Estimates are shaded. Top right: F and SSB over the time-series in the assessment.

The current SSB is the highest since the 1960s. F is well below  $F_{MSY}$  but has increased slightly since 2010. There are three recent strong year classes (2003/4, 2005/6, and 2007/8) in the fishery. The 2008/9 and 2009/10 year classes are currently estimated to be above average.

**Management plans**

A long-term management plan was agreed by the Pelagic RAC in 2011 (Annex 5.4.15). In 2012 ICES evaluated this plan and found it to be in accordance with the precautionary approach. This plan has a target  $F = 0.23$  and a 30% constraint in TAC change and would result in catch advice of 22 360 t for 2014. The European Commission has communicated to ICES that its preference is that ICES advice follows the ICES MSY transitional framework, while the outcomes from following this plan should be presented in the catch options table. Because F has been below  $F_{MSY}$  since 2007, this corresponds to the ICES MSY approach.

## Biology

This stock can be divided into autumn and winter spawning components. Spawning begins in October and can continue until February. A proportion of this stock, mainly first-time spawners, return from the Irish Sea to spawn in the Celtic Sea. The spawning grounds are located inshore, close to the coast, and consist of either gravel or flat stone. Spawning and nursery areas are sensitive and vulnerable to anthropogenic influences. Gravel extraction or disturbance in the close vicinity of any herring spawning will disturb that spawning activity and will reduce the available area for successful spawning.

### Environmental influence on the stock

Temperatures have been increasing for several decades and salinity may also be increasing. Recruitment in this stock has fluctuated widely, although studies have yet to demonstrate a relationship to environmental change(s). The impact of the highly variable environment on the stock is unclear.

### The fisheries

There has been considerable efficiency creep in the fishery since the 1980s with a greater ability to locate fish. Under the current management regime the quality of the catch data has improved. Discarding is thought to be low, and there are no observations of discarding or slippage in the Celtic Sea fisheries that target herring. In 2010 and 2011 there were concerns of an elevated risk of discarding due to the quota management system. However, in 2012 this risk is thought to be lower, given the flexibility incorporated into the weekly quota system whereby a vessel could use some of the following week's quota to avoid slippage. In this area sprat landings have increased substantially and misreporting of sprat and herring occur. There is also a concern that sprat in this area may be fished together with bycatches of juvenile herring.

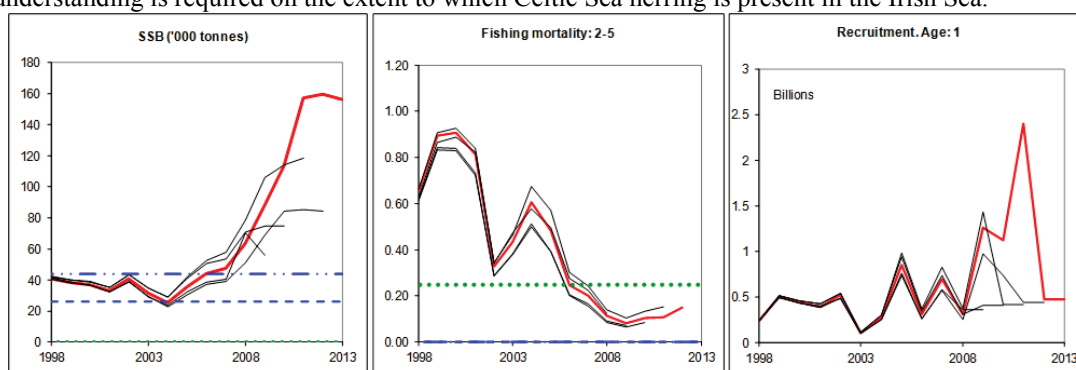
**Catch distribution** Total landings (2012/2013) = 21 604 t, of which 100% were caught by pelagic trawl.

### Effects of the fisheries on the ecosystem

Herring fisheries for human consumption are considered relatively clean, with little bycatch of other fish.

### Quality considerations

There is a large uncertainty in the estimation of 1-ringers. As these contribute to the SSB (50% mature) this influences estimates and forecasts. The biomass estimate from the acoustic survey doubled between 2011 and 2012 to a level that has not been previously seen in the time-series. This will be further investigated as part of the benchmark in 2014. Improved information on discards is required as this appears to have become a feature of this fishery in recent years; however, after the changes in the regulations of weekly quota allocations in 2012, the risk of discarding is reduced. Greater understanding is required on the extent to which Celtic Sea herring is present in the Irish Sea.



**Figure 5.4.15.2** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). Historical assessment results (final-year predicted SSB and recruitment estimates included).

### Scientific basis

<b>Assessment type</b>	Age-based analytical assessment (FLICA).
<b>Stock data category</b>	Category 1.
<b>Input data</b>	Commercial catches, (weights, ages and length frequencies from catch sampling); Acoustic survey index (CSHAS), annual weights in the stock, fixed maturity ogive, natural mortality assumed to be constant.
<b>Discards and bycatch</b>	Discards are not included in the assessment and are considered to be low.
<b>Indicators</b>	None.
<b>Other information</b>	Celtic Sea and Division VIIj herring are assessed on a seasonal basis, 1 April–31 March, to allow for the inclusion of the spawning cycle in the assessment period.
<b>Working group report</b>	<a href="#">HAWG</a> (ICES, 2013).

**ECOREGION** Celtic Seas  
**STOCK** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland)

**Reference points**

	Type	Value	Technical basis
MSY Approach	MSY $B_{trigger}$	61 000 t.	Stochastic simulations on segmented regression stock–recruitment relationship.
	$F_{MSY}$	0.25	Stochastic simulations on segmented regression stock–recruitment relationship.
Management Plan	SSB <sub>MGT</sub>	61 000 t.	Stochastic simulations on segmented regression stock recruit relationship.
	$F_{MGT}$	0.23	If SSB in TAC year >61 000.
Precautionary approach	$B_{lim}$	26 000 t.	The lowest stock observed.
	$B_{pa}$	44 000 t.	Low probability of low recruitment.
	$F_{lim}$	Not defined.	
	$F_{pa}$	Not defined.	

(Changed in 2013)

**Outlook for 2014**

Basis:  $F(2013/2014) = F(\text{catch constraint } 2013/2014) = 0.12$ ;  $R(2012-2014) = GM(1981-2010) = 474$  million;  $SSB(2013/2014) = 156\,355$ ;  $\text{catch}(2013/2014) = 19\,063$ .

Rationale	Catch (2014)	SSB (2014) <sup>1)</sup>	Basis	F (2014)	SSB (2015)	%SSB Change <sup>2)</sup>	% TAC Change <sup>3)</sup>
MSY approach	35 942	136 113	$F_{MSY}$	0.25	115 063	-15%	+109%
Long-term management plan	22 360	144 226	Management plan	0.15	133 211	-8%	+30%
Zero catch	0	156 805	Zero catch	0	165 458	+6%	-100%
Other options	22 737	144 006	$F_{2012}$	0.15	132 692	-8%	+32%
	17 200	147 209	<i>status quo</i> catch	0.11	140 396	-5%	0%

Weights in tonnes.

<sup>1)</sup> For this autumn-spawning stock, the SSB is determined at spawning time and is influenced by fisheries between 1st April and spawning.

<sup>2)</sup> SSB 2015 relative to SSB 2014.

<sup>3)</sup> Catch (assumed equal to landings) 2014 relative to TAC 2013.

**MSY approach**

Following the ICES MSY approach implies fishing mortality be increased to 0.25 which is higher than the current  $F(0.15)$ , resulting in landings of less than 35 942 t in 2014. This is expected to lead to an SSB of 115 063 t in 2015. Discards are considered to be low, and therefore, all catches are assumed to be landed. Because  $F$  has been below  $F_{MSY}$  since 2007, a transition to MSY is not relevant.

**Management plan**

In 2011 the Pelagic RAC agreed a new proposed long-term management plan (Annex 5.4.15). This plan has a target  $F$  of 0.23 and a 30% constraint on TAC change. This TAC constraint prevents sudden changes of the TAC and accounts for uncertainties in the assessment and forecast in the event of strong or low incoming recruitment. This plan would lead to a TAC in 2014 of 22 360 t. In 2012 ICES evaluated this plan and found it to be in accordance with the precautionary approach. It leads to sustainable yield and provides stability in catches over time, at the expense of maximizing yield. ICES was not able to simulate the effect of the closed area, but from an operational point of view it seems to have worked to reduce  $F$  under the recent recovery plan.

### Precautionary approach

The SSB is well above  $B_{pa}$ .  $F_{pa}$  is undefined, but current  $F$  is well below  $F_{MSY}$ . ICES does not advise using  $B_{pa}$  as a target in 2014.

### Additional considerations

Gravel substrate is an important fish habitat for herring spawning. Herring spawning and nursery areas are sensitive and vulnerable to anthropogenic influences. Activities that have an impact on the spawning habitat of herring, such as extraction of marine aggregates (e.g. gravel and sand; Groot, 1979, 1996) and construction in the marine environment, can impact spawning. Herring regularly abandon and repopulate spawning grounds and absence of spawning in any particular year does not mean that the spawning ground is not required to maintain a resilient herring population.

There was concern of an increased risk of discarding of herring in 2010 and 2011. This risk is thought to have diminished in 2012, given the changes in the regulations of weekly quota allocations.

### Regulations and their effects

There is evidence that the closure of Division VIIaS under the rebuilding plan, in reducing the efficiency of the fleet has helped to substantially reduce fishing mortality. This closed area has been the dominant spawning area, and before the closure a large proportion of the catch was taken from it. There is no evidence that this closure has led to improved recruitment. However, this area, particularly the area off Dunmore East, is important for recruit spawners. This area was reopened in January 2012, although vessels >50 ft remain excluded. The abundance of herring in this area has attracted more vessels to the fishery and resulted in increased catches outside the closed area.

### Uncertainties in assessment and advice

There has been retrospective overestimation of  $F$  in recent years. There is uncertainty in the estimation of 1-ring recruits. As these contribute to the SSB (50% mature at 1 ring) this causes some uncertainty in the estimated SSB.

The reason for the large increase in the biomass estimate from the 2012 acoustic survey is not known and will be investigated as part of the benchmark in 2014.

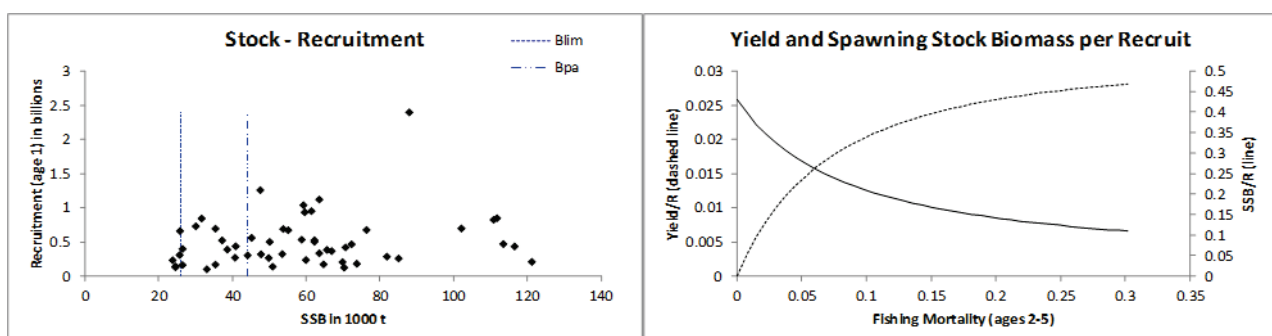
Juveniles caught in the sprat fishery should be better understood in order to improve the estimates of juvenile fishing mortality.

### Comparison with previous assessment and advice

The 2013 assessment shows an upward revision in SSB 2012 by 90%, while  $F$  for 2011 is estimated to be 28% lower. The basis for this year's advice is the same as last year (MSY approach).

### Sources

- Groot, S. J. de. 1979. The potential environmental impact of marine gravel extraction in the North Sea. *Ocean Management*, 5: 233–249.
- Groot, S. J. de. 1996. The physical impact of marine aggregate extraction in the North Sea. *ICES Journal of Marine Science*, 53: 1051–1053.
- ICES. 2013. Report of the Herring Assessment Working Group for the Area South of 62°N, 12–21 March 2013. ICES CM 2013/ACOM:06.



**Figure 5.4.15.3** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). Stock–recruitment plot and yield-per-recruit analysis.

**Table 5.4.15.1** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). ICES advice, management, and landings/catches.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official landings	Discards	ICES catch <sup>1</sup>
1987	Precautionary TAC	18	18	18	4.2	27.3
1988	TAC	13	18	17	2.4	19.2
1989	TAC	20	20	18	3.5	22.7
1990	TAC	15	17.5	17	2.5	20.2
1991	TAC (TAC excluding discards)	15 (12.5)	21	21	1.9	23.6
1992	TAC	27	21	19	2.1	23.0
1993	Precautionary TAC (including discards)	20–24	21	20	1.9	21.1
1994	Precautionary TAC (including discards)	20–24	21	19	1.7	19.1
1995	No specific advice	-	21	18	0.7	19.1
1996	TAC	9.8	16.5–21 <sup>2</sup>	21	3	21.8
1997	If required, precautionary TAC	< 25	22	20.7	0.7	18.8
1998	Catches below 25	< 25	22	20.5	0	20.3
1999	F = 0.4	19	21	19.4	0	18.1
2000	F < 0.3	20	21	18.8	0	18.3
2001	F < 0.34	17.9	20	19	0	17.7
2002	F < 0.35	11	11	11.5	0	10.6
2003	Substantially less than recent catches	-	13	12	0	10.9
2004	60% of average catch 1997–2000	11	13	12	-	11.1
2005	60% of average catch 1997–2000	11	13	10	-	8.5
2006	Further reduction 60% avg. catch 2002–2004	6.7	11	9	-	8.5
2007	No fishing without rebuilding plan	--	9.4	9.6	-	8.3
2008	No targeted fishing without rebuilding plan	--	7.9	7.8	-	6.9
2009	No targeted fishing without rebuilding plan	--	5.9	6.2	( <sup>3</sup> )	5.8
2010	F <sub>mgt</sub> = 0.19	10.15	10.15	9.6	( <sup>3</sup> )	8.4
2011	See scenarios	-	13.2	11.7	( <sup>3</sup> )	11.5
2012	MSY approach	< 26.9	21.1	21.6	-	21.6
2013	MSY approach	< 18.5				
2014	MSY approach	< 35.942				

Weights in thousand tonnes.

<sup>1</sup>) By calendar year.

<sup>2</sup>) Revised in 1996 after the ACFM May meeting.

<sup>3</sup>) Increased risk of discarding.

**Table 5.4.15.2**

Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). Landings in tonnes by quota year as estimated by ICES. These figures may not correspond to the official statistics in all cases and cannot be used for management purposes.

Year	France	Germany	Ireland	Netherlands	U.K.	Unallocated	Discards	Total
1988	-	-	16 800	-	-	-	2 400	19 200
1989	+	-	16 000	1 900	-	1 300	3 500	22 700
1990	+	-	15 800	1 000	200	700	2 500	20 200
1991	+	100	19 400	1 600	-	600	1 900	23 600
1992	500	-	18 000	100	+	2 300	2 100	23 000
1993	-	-	19 000	1 300	+	-1 100	1 900	21 100
1994	+	200	17 400	1 300	+	-1 500	1 700	19 100
1995	200	200	18 000	100	+	-200	700	19 000
1996	1 000	0	18 600	1 000	-	-1 800	3 000	21 800
1997	1 300	0	18 000	1 400	-	-2 600	700	18 800
1998	+	-	19 300	1 200	-	-200	-	20 300
1999		200	17 900	1 300	+	-1 300	-	18 100
2000	573	228	18 038	44	1	-617	-	18 267
2001	1 359	219	17 729	-	-	-1 578	-	17 729
2002	734	-	10 550	257	-	-991	-	10 550
2003	800	-	10 875	692	14	-1 506	-	10 875
2004	801	41	11 024	-	-	-801	-	11 065
2005	821	150	8 452	799	-	-1 770	-	8 452
2006	-	-	8 530	518	5	-523	-	8 530
2007	581	248	8 268	463	63	-1 355	-	8 268
2008	503	191	6 853	291		-985	-	6 853
2009	364	135	5 760			-499	-	5 760
2010	636	278	8 406	325		-1 239	na	8 406
2011	241		11 503	7		-248	na	11 503
2012	3	230	16 132	3 135		2 104	na	21 604

na = Not available.

**Table 5.4.15.3** Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). Landings in tonnes by assessment year (1 April–31 March) as estimated by ICES. These figures may not correspond to the official statistics in all cases and cannot be used for management purposes.

Year	France	Germany	Ireland	Netherlands	U.K.	Unallocated	Discards	Total
1988	-	-	16 800	-	-	-	2 400	19 200
1989	+	-	16 000	1 900	-	1 300	3 500	22 700
1990	+	-	15 800	1 000	200	700	2 500	20 200
1991	+	100	19 400	1 600	-	600	1 900	23 600
1992	500	-	18 000	100	+	2 300	2 100	23 000
1993	-	-	19 000	1 300	+	-1 100	1 900	21 100
1994	+	200	17 400	1 300	+	-1 500	1 700	19 100
1995	200	200	18 000	100	+	-200	700	19 000
1996	1 000	0	18 600	1 000	-	-1 800	3 000	21 800
1997	1 300	0	18 000	1 400	-	-2 600	700	18 800
1998	+	-	19 300	1 200	-	-200	-	20 300
1999		200	17 900	1 300	+	-1 300	-	18 100
2000	573	228	18 038	44	1	-617	-	18 267
2001	1 359	219	17 729	-	-	-1 578	-	17 729
2002	734	-	10 550	257	-	-991	-	10 550
2003	800	-	10 875	692	14	-1 506	-	10 875
2004	801	41	11 024	-	-	-801	-	11 065
2005	821	150	8 452	799	-	-1 770	-	8 452
2006	-	-	8 530	518	5	-523	-	8 530
2007	581	248	8 268	463	63	-1 355	-	8 268
2008	503	191	6 853	291		-985	-	6 853
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2012	3	230	16 132	3 135		2 104	na	21 604

na = Not available.

Table 5.4.15.4

Herring in Divisions VIIa (South of 52°30'N) and VIIg,h,j,k (Celtic Sea and South of Ireland). Summary of stock assessment (weights in tonnes).

Year	Recruitment age			Fbar	Landings
	1	TSB	SSB		
1958	288 373	103 700	73 614	0.40	22 978
1959	837 830	128 408	69 732	0.34	15 086
1960	185 856	82 550	58 650	0.49	18 283
1961	210 142	71 131	49 703	0.31	15 372
1962	537 886	109 309	59 144	0.66	21 552
1963	270 227	82 363	53 377	0.45	17 349
1964	1 043 566	159 436	76 250	0.28	10 599
1965	327 806	141 067	101 991	0.25	19 126
1966	679 877	182 800	110 738	0.30	27 030
1967	702 422	191 042	116 417	0.38	27 658
1968	829 536	206 978	121 112	0.35	30 236
1969	438 644	171 065	111 653	0.54	44 389
1970	212 938	119 642	84 961	0.48	31 727
1971	852 710	164 750	81 779	0.71	31 396
1972	263 048	112 910	70 178	0.76	38 203
1973	290 193	87 998	50 778	0.76	26 936
1974	128 521	56 925	35 244	0.84	19 940
1975	143 143	45 867	26 301	0.77	15 588
1976	173 512	45 273	24 406	0.66	9 771
1977	168 125	43 278	23 658	0.57	7 833
1978	133 883	40 641	24 429	0.53	7 559
1979	236 786	51 778	26 336	0.68	10 321
1980	146 966	43 350	25 628	0.71	13 130
1981	402 717	68 337	29 930	1.02	17 103
1982	665 373	104 604	45 077	0.73	13 000
1983	734 069	129 830	62 115	0.72	24 981
1984	564 655	112 412	62 120	0.90	26 779
1985	508 250	108 687	61 286	0.52	20 426
1986	529 559	119 222	65 520	0.68	25 024
1987	956 849	148 814	72 186	0.78	2 6200
1988	388 948	109 853	70 550	0.44	20 447
1989	471 462	110 838	64 580	0.56	23 254
1990	425 497	98 532	59 496	0.47	1 8404
1991	177 221	70 596	47 619	0.72	25 562
1992	939 386	125 591	53 654	1.04	21 127
1993	324 272	87 125	54 981	0.62	18 618
1994	694 262	120 157	63 426	0.46	19 300
1995	676 645	119 982	66 791	0.58	23 305
1996	339 848	91 363	59 809	0.42	18 816
1997	370 991	83 718	49 968	0.63	20 496
1998	240 786	65 760	40 753	0.65	18 041
1999	506 060	77 994	38 459	0.89	18 485
2000	442 034	73 450	37 066	0.91	17 191
2001	393 052	62 587	32 913	0.81	15 269
2002	527 809	80 799	40 574	0.33	7 465
2003	105 670	47 981	31 500	0.43	11 536
2004	274 962	50 633	25 520	0.61	12 743
2005	848 467	86 480	35 251	0.48	9 494
2006	313 288	71 712	43 986	0.25	6 944
2007	698 959	87 587	47 422	0.20	7 636
2008	308 671	90 849	63 421	0.11	5 872
2009	1 263 455	163 298	87 849	0.08	5 745
2010	1 125 320	187 401	113 374	0.10	8 370
2011	2 402 231	288 026	157 338	0.11	11 470
2012*	474 106	296 392	159 776	0.15	21 604
2013*	474 106		156 355		

\*Geometric Mean Recruitment 1981–2010.



**Annex 5.4.15 Long-term management plan for herring in the Celtic Sea and Division VIIj, as agreed by the Pelagic RAC**

1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 41,000 t, the level below which recruitment becomes impaired.
2. Where the SSB, in the year for which the TAC is to be fixed, is estimated to be above 61,000 t ( $B_{trigger}$ ) the TAC will be set consistent with a fishing mortality, for appropriate age groups, of 0.23 ( $F_{target}$ ).
3. Where the SSB is estimated to be below 61,000 tonnes, the TAC will be set consistent with a fishing mortality of:

$$SSB * 0.23 / 61,000$$

4. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 30 % from the TAC of the preceding year, the TAC will be fixed such that it is not more than 30 % greater or 30 % less than the TAC of the preceding year.
5. Where the SSB is estimated to be below 41,000 tonnes, Subdivision VIIaS will be closed until the SSB has recovered to above 41,000 tonnes.
6. Where the SSB is estimated to be below 41,000 tonnes, and Sub-Division VIIaS is closed, a small-scale sentinel fishery will be permitted in the closed area. This fishery will be confined to vessels, of no more than 50 feet in registered length. A maximum catch limitation of 8% of the Irish quota will be exclusively allocated to this sentinel fishery.
7. Notwithstanding paragraphs 2, 3 and 4, if the SSB is estimated to be at or below the level consistent with recruitment impairment (41,000 t), then the TAC will be set at a lower level than that provided for in those paragraphs.
8. No vessels participating in the fishery, if requested, will refuse to take on-board any observer for the purposes of improving the knowledge on the state of the stock. All vessels will, upon request, provide samples of catches for scientific analyses.
9. Every three years from the date of entry into force of this Regulation, the Commission will request ICES and STECF to review and evaluate the plan.
10. This arrangement enters into force on 1st January, 2012.